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PREFACE

Preface

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In 2017, the astronomical and geodetic communities will celebrate the 50-year anniversary of the first Very Long Baseline Interferometry (VLBI) experiments. The *Journal of Geodesy* Special Issue titled "VLBI contribution to reference frames and Earth's rotation studies" is dedicated to this great jubilee.

VLBI plays a key role in astronomy and geodesy. It provides unprecedented spatial resolution and position measurements on the sky with an accuracy superior to other techniques. VLBI is a key space geodetic technique since the 1970s, which fundamentally contributes to the maintenance of terrestrial (TRF) and celestial (CRF) reference frames, including the International Terrestrial (ITRF) and Celestial (ICRF) Reference Frames, and monitoring of the Earth's rotation with respect to the ITRF and ICRF through determination of highly accurate Earth orientation parameters (EOP). Furthermore, the VLBI technique is unique in determining the Universal Time and the precession–nutation of the Earth's rotation axis in space. Consequently, it is the only technique capable to provide a consistent TRF–EOP–CRF solution. VLBI also essentially contributes to Solar System dynamics and space and terrestrial navigation, atmospheric studies and refining geophysical models, crustal movements and plate tectonics, time and frequency transfer, and testing physical theories.

The most accurate and valuable VLBI results are obtained from global VLBI station networks involving radio telescopes located in different countries on different continents. Therefore, a successful realization of the VLBI observing programs requires both inter-institutional and international cooperation. Since 1999, this cooperation is realized through the International VLBI Service for Geodesy and Astrometry (IVS). Moreover, the IVS provides the combined IVS products, such as EOP and VLBI TRF realization (VTRF). The latter essentially contributes to the multi-technique ITRF solution providing the longest station position time series and defining, together with Satellite Laser Ranging (SLR), the ITRF scale and scale rate. Including the radio source positions in the combination is under investigation. A dedicated paper in this issue describes the current state and perspectives of the IVS operations.

The previous Special Issue of *Journal of Geodesy* devoted to VLBI and published in June 2007 (volume 81, issue 6–8) was highly successful. Since that time, many important changes and impressive improvements in the VLBI technique and analysis happened, such as VLBI2010 technical design, the start of the next-generation global VLBI network VLBI Global Observing System (VGOS), publishing ICRF2 and preparing ICRF3, and implementing new IVS combined EOP–TRF products based on combination of datum-free normal equations. All these researches and developments aim at achieving the 1 mm accuracy in TRF and EOP. To reach this goal, the development of technology should be accompanied by improvement in the geophysical and astronomical modelling as well as in the analysis strategy.

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